11-6760-206-12

TM 11-6760-206-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR
AND ORGANIZATIONAL
MAINTENANCE MANUAL

METER, PHOTOGRAPHIC EXPOSURE LM–46A

HEADQUARTERS, DEPARTMENT OF THE ARMY

SEPTEMBER 1960

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TECHNICAL MANUAL
No. 11-6760-206-12

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *14 Sept. 1960*

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

METER, PHOTOGRAPHIC EXPOSURE LM-46A

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CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

This manual describes Meter, Photographic Exposure LM–46A and contains instructions for the operation and operator and organizational maintenance of this equipment. Instructions for using the equipment to the best advantage under a variety of conditions are included.

2. Forms and Records

a. Unsatisfactory Equipment Reports. Fill out and forward DA Form 468 (Unsatisfactory Equipment Report) to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS-MLM, Fort Monmouth, N. J., as prescribed in AR 700–38.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700–58 (Army), Navy Shipping Guide, Article 1850–4 (Navy), and AFR 71–4 (Air Force).

c. Preventive Maintenance Forms. Prepare DA Form 11–254 (fig. 5 and 6) (Maintenance Check List for Signal Equipment (Still and Motion Picture Camera)) in accordance with the instructions on the form.

d. Parts List Form. Forward DA Form 2028 (Recommended Changes to DA Technical Manual Parts List or Supply Manuals 7, 8, and 9) direct to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS-MLM, Fort Monmouth, N. J., with comments on parts listing.

e. Comments on Manual. Forward all other comments on this manual to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: Pub Engrg Dept, Fort Monmouth, N. J.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

The LM-46A measures light intensities and converts light value readings to proper combinations of camera shutter speed and lens aperture settings. It is used as an aid in producing the best negative possible, under existing light conditions, with the particular type of film in use. The exposure meter is intended primarily for field use with still picture cameras, but can be adapted for use with motion picture cameras.

4. Technical Characteristics

Lightmeter:

Type	Matched photoelectric cell and microammeter.
Dial calibration unit	Candles per square foot.
Range	0 to 1,600 foot-candles.

Calculating dial ranges:

Exposure index dial	0.1 to 12,000 American Standards Association (ASA) units.
Relative aperture dial	f/1 to f/32.

Time and brightness dial:

Time scale.....1/1000 second to 100 seconds.

Brightness scale.....0 to 1,600 foot-candles.

5. Components of Meter, Photographic Exposure LM–46A

(fig. 1)

Quantity	Item	Dimensions (in.)			Weight (oz)
		Height	Depth	Width	
1	Exposure meter	3 1/4	5/8	2 1/2	5 1/2
1	Carrying cord	1/2	30	1/16	1/10
1	Carrying case	4 1/4	1 3/8	2 5/8	1 1/2
1	TM 11-6760-206-12				

6. Description of LM–46A

(fig. 1)

The exposure meter consists of a lightmeter assembly with a dial calibrated in foot-candles; a set of concentric, calibrated dials with a cursor; and an aluminum alloy case. A hinged baffle, controlled by a spring-loaded baffle button, covers or exposes a photoelectric cell and forms one end of the case. A slot at the other end of the case accommodates a nylon carrying cord. A leather carrying case houses and protects the exposure meter when it is not in use.

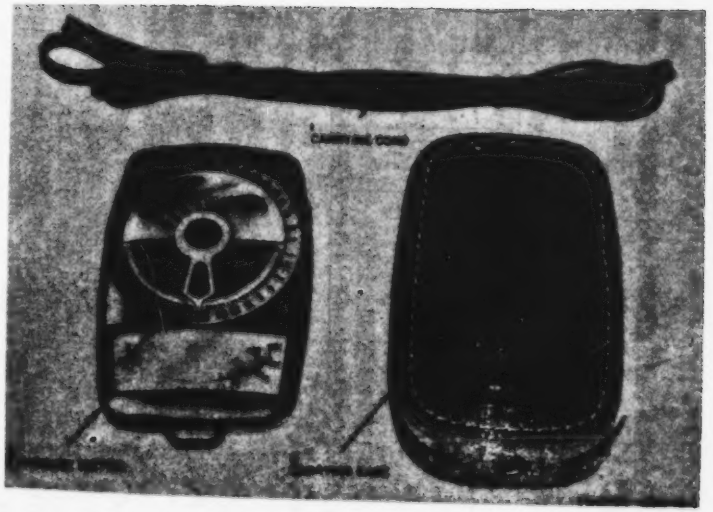


Figure 1. Meter, Photographic Exposure LM-46A.

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

7. Unpacking
(fig. 2)

a. Packaging Data. The exposure meter, inclosed in its carrying case, is wrapped for protection and then placed, together with a suitable amount of desiccant and a humidity indicator, within a moisture-vaporproof barrier bag, which then is heat-sealed. The packaged equipment is packed in a corrugated fiberboard carton and the carton is sealed with gummed tape. Packed for shipment, the equipment measures 4¾ inches, by 4 inches, by 3¼ inches and weighs approximately 1 pound.

b. Removing Contents.

(1) Slit the gummed tape that seals the corrugated fiberboard carton and open the carton. Remove the packaged equipment from the carton.

(2) Slit open the moisture-vaporproof barrier bag and remove the wrapped equipment.

(3) Carefully remove the exposure meter from the wrapping and cushioning materials.

Caution: **The LM–64A can be damaged easily. Do not drop it and handle it carefully at all times.**

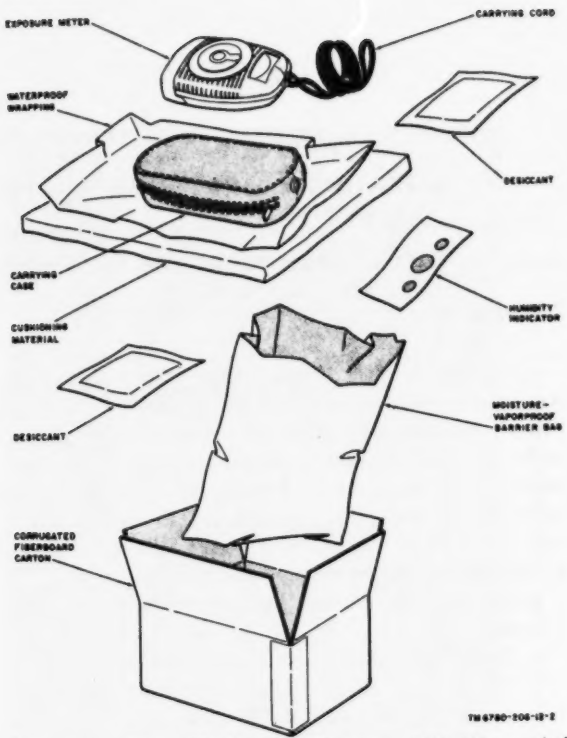


Figure 2. Meter, Photographic Exposure LM-46A, typical packaging arrangement.

8. Checking Unpacked Equipment

a. Check the equipment against the packing list or the list of components in paragraph 5.

b. Inspect the equipment carefully for damage that may have been incurred during shipment.

c. If the equipment does not check with the packing list, or if any damage is noted, refer to paragraph 2*b*.

Section II. LIGHT READINGS

9. General

Methods of using the exposure meter under a variety of conditions to take light readings for use in determining exposures that will produce the best possible negative are described in this section. The production of negatives for special effects is not considered.

10. Types of Light Readings

a. Reflected Light Readings. Reflected light readings are measurements of the intensity of the light reflected from a scene or object and generally are more accurate than incident light readings (*b* below), except when the prevailing illumination is at a low level. Reflected light readings may be taken with the exposure meter either in the *camera position* ((1) below) or in the *near-object* position ((2) below). In either position, hold the exposure meter so that it receives light only from that portion of the scene or object that is to be included in the photograph.

(1) *Camera position.* Use this position when the range of brightness of the entire scene is within the range of the film being used. Hold the exposure meter near the camera and aim the exposure meter toward the scene to be photographed. If the scene includes an excessive amount of sky, point the exposure meter downward so that the line of sight along the upper surface of the exposure meter meets the ground at a point approximately halfway between the exposure meter and the center of the scene.

(2) *Near-object position.* Use this position when the range of brightness of a scene exceeds the range of the film being used or when certain details are to be emphasized and the surrounding light is in definite contrast to that reflected from the pertinent area. Hold the exposure meter near the object or the significant area of the scene and aim the exposure meter toward the object or portion of the scene or object to be emphasized. Be careful not to cast a shadow on the object while a reflected light reading is being taken.

b. Incident Light Readings. Incident light readings are measurements of the intensity of the light by which a scene or object is illuminated. Use incident light readings to determine the best average exposure when the general illumination is at a low level. Hold the exposure meter near the object or the center of the scene and aim the exposure meter toward the camera. If the light comes from one side, point the exposure meter about halfway between the light source and the camera.

Caution: **Never point the exposure meter directly at the sun.**

11. Average Brightness Method

Use this method when the scene has no outstanding light or dark areas, its range of brightness is within the range of the film being used, and no details require special emphasis. Take reflected light readings (par. 10*a*) from either the camera position (*a* below) or the near-object position (*b* below), as appropriate.

a. Camera Position. Use this position when the scene has comparatively even illumination and no

extremely bright or dark spots, such as reflections from water, or deep shadows cast by heavy foliage. Take *one* reflected light reading (par. 10*a*(1)).

b. Near-Object Position. Use this position when the subject is strongly side- or back-lighted or when some very dark or very bright object within the general scene is of primary importance. Take one reflected light reading (par. 10*a*(2)) using the darkest-object method (par. 13) and one reflected light reading using the brightest-object method (par. 12). The light value midway between these two readings (par. 18*c*(3)) is the average brightness of the scene.

12. Brightest-Object Method

Use this method when both the brightness of the darkest object and the average brightness of the scene are below the range of the exposure meter, when complete detail in the brightest portion of the scene is required, and when a light reading of the brightest object is required to determine the average brightness of a scene (par. 11*b*). Hold the exposure meter close to the brightest object in which full detail is desired; disregard incidental bright spots such as a window in an interior scene or a patch of bright sunlight in an otherwise shaded area. Take one reflected light reading (par. 10*a*(2)).

13. Darkest-Object Method

Use this method when the most important object in a scene is very dim or has adjacent reflections or bright spots unrelated to the subject, and when a light reading of the darkest object is required to determine the average brightness of the scene (par. 11*b*). This method may be used also for any scene (except

one in which complete detail in the brightest object is required), because it will place the darkest object within the film range. Hold the exposure meter near the darkest object in which complete detail is desired. The distance between the exposure meter and the object should be approximately the width of the object; for example, about 6 inches, if a face is being photographed. Take one reflected light reading (par. 10*a*(2)).

14. Color Photography

In color photography, the light readings required to determine the proper exposure depend upon the colors that are of particular interest. Do not consider black, white, and brilliant, mirror-like reflections as colors. Take reflected light readings from the near-object position (par. 10*a*(2)) as follows:

a. If the dark colors are of particular interest, take one light reading of the darkest color.

b. If the bright colors are of particular interest, take one light reading of the brightest color.

c. If the medium colors are of particular interest, take one light reading of the darkest color and one light reading of the lightest color. Use the light value midway between these two readings (par. 18*c*(3)).

d. If the photograph is a portrait, take one light reading of the highlighted portion of the face.

15. Substitution Method

Use this method when it is difficult or impossible to take reflected light readings from the near-object position because the actual objects or the most important objects in a scene are inaccessible (for instance, on the far side of a stream). Take the reflected light

readings indicated in paragraphs 11*b* and 12 through 14 of similar, nearby objects that are lighted in the same manner as the inaccessible objects. For example, substitute a light reading of a nearby building of similar material for a light reading of a distant group of buildings, or substitute a light reading of the palm of the hand for a light reading of a person's face. Be sure the substitute object and the actual object are lighted the same way; for example, if the actual object is in full sunlight, the substitute object also must be in full sunlight.

16. Best Average Exposure Method

Use this method when every part of the subject is of equal importance, such as a group of people; when the scene includes both highlighted and shadowed areas of equal significance; and when the general illumination is at a low level. Take one incident light reading (par. 10*b*).

Section III. OPERATION UNDER USUAL CONDITIONS

17. Controls and Indicators

(fig. 3)

a. Controls.

Control	Function
EXP. ASA INDEX selector	Sets on the exposure index dial (*b* below) the emulsion speed in ASA units of the film in use.

Control	Function
Baffle button	When depressed, lowers the baffle to expose the photoelectric cell to direct light and shifts the relative aperture dial (*b* below) from REFLECTED LIGHT position to INCIDENT LIGHT position.
SET ZERO screw	Permits adjustment of lightmeter pointer to 0 position.

b. Indicators.

Indicator	Function
Lightmeter	Indicates in foot-candles (direct light) or as relative brightness (reflected light) the intensity of light striking the photoelectric cell.
Exposure index dial	Used with EXP. ASA INDEX selector (*a* above) to set up in ASA units the emulsion speed of the film in use.
Time and brightness dial:	
Brightness scale	Used to set up the light value measured by the lightmeter in relation to the emulsion speed of the film.
Time scale	Indicates the shutter speed for the corresponding lens aperture indicated on the relative aperture dial in relation to the light value and emulsion speed settings.

Indicator	Function
Relative aperture dial:	
REFLECTED LIGHT position	Indicates the lens aperture for the corresponding shutter speed indicated on the time scale in relation to the light value and film emulsion speed settings when the light value setting is a function of reflected light.
INCIDENT LIGHT position	Indicates the lens aperture for the corresponding shutter speed indicated on the time scale in relation to the light value and film emulsion speed settings when the light value setting is a function of incident light.

18. Calculating Exposure

a. Determining Film Emulsion Speed. Determine the emulsion speed rating in ASA units of the film being used. If the emulsion speed rating, as given by the film manufacturer, is not in ASA units, refer to the film emulsion speed rating chart below to find the ASA rating that is equivalent to the rating given for the film being used.

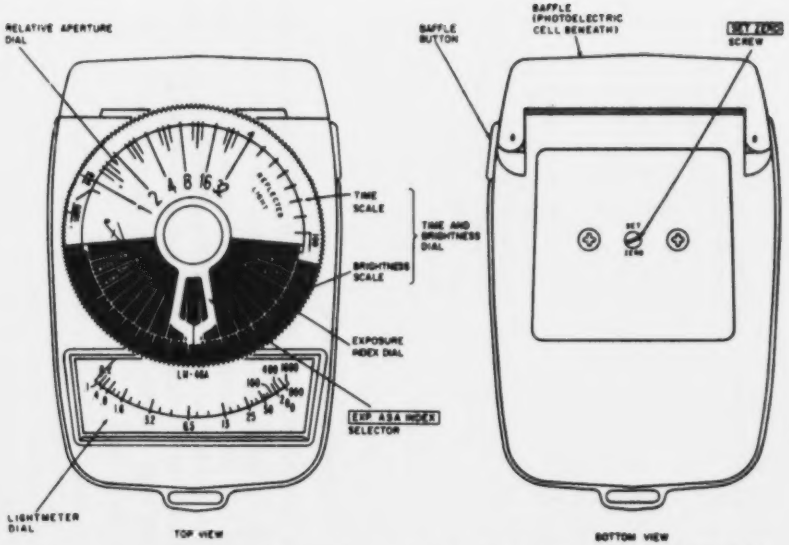


Figure 8. Exposure meter controls and indicators.

ASA	Weston	General electric	Hurter and driffield	American scheiner	European scheiner	Din
0.1	0.07		1.87			
0.12	0.08		2.18			
0.16	0.12		3.12			
0.2	0.15		3.75			
0.25	0.17		4.37			
0.3	0.25		6.25			
0.4	0.3		7.5			
0.5	0.35		8.75			
0.6	0.5	0.6	12.5	4	10	
0.8	0.6		15.0	5	11	1/10
1.0	0.7	1.0	17.5	6	12	2/10
1.2	1.0	1.5	25	7	13	3/10
1.6	1.2	2.0	30	8	14	4/10
2.0	1.5		38	9	15	5/10
2.5	2.0	3.0	50	10	16	6/10
3	2.5	4.0	63	11	17	7/10
4	3	4.5	75	12	18	8/10
5	4	6.0	100	13	19	9/10
6	5	8	125	14	20	10/10
8	6	10	150	15	21	11/10

ASA	Weston	General electric	Hurter and driffield	American scheiner	European scheiner	Din
10	8	12	200	16	22	12/10
12	10	16	250	17	23	13/10
16	12	20	300	18	24	14/10
20	16	24	400	19	25	15/10
25	20	32	500	20	26	16/10
32	24	40	600	21	27	17/10
40	32	38	800	22	28	18/10
50	40	64	1,000	23	29	19/10
64	50	80	1,250	24	30	20/10
80	64	100	1,600	25	31	21/10
100	80	125	2,000	26	32	22/10
125	100	150	2,500	27	33	23/10
160	125	200	3,120	28	34	24/10
200	160	250	4,000	29	35	25/10
250	200	300	5,000	30	36	26/10
300	250	400	6,250	31	37	27/10
400	320	500	8,000	32	38	28/10
500	400	600	10,000	33	39	29/10
650	500	800	12,500	34	40	30/10
800	650	900	16,250	35	41	31/10

1,000	800	1,200	20,000	36	42	32/10
1,250	950	1,520	11,250	37	43	33/10
1,600	1,300	1,800	32,500	38	44	34/10
2,000	1,600	2,400	40,000	39	45	35/10
3,000	2,400	3,600	60,000	40	46	36/10
4,000	3,200	4,800	80,000	41	47	37/10
5,000	4,000	6,000	100,000	42	48	38/10
6,000	4,800	7,200	120,000	43	49	39/10
8,000	6,400	9,600	160,000	44	50	40/10
10,000	8,000	12,000	200,000	45	51	41/10
12,000	9,600	14,400	240,000	46	52	42/10

b. Setting EXP. ASA INDEX Selector. Align the red index line of the EXP. ASA INDEX selector with the calibration on the exposure index dial that corresponds to the ASA rating of the film (*a* above).

c. Taking Light Readings. Select the method of taking light reading that is appropriate to the subject (pars. 11–16). Take the indicated light readings as follows:

(1) Take reflected light readings (par. 10*a*) with the baffle closed (baffle button in normal or released position). Take incident light readings (par. 10*b*) with the baffle lowered (baffle button depressed).

(2) Hold the exposure meter in the position indicated for taking light readings by the selected method and read the light value indicated by the lightmeter.

(3) When two light readings are required (pars. 11*b* and 14*c*), to determine the average brightness (light intensity) of the scene, find on the lightmeter dial the light value midway between the two readings; this light value is the average brightness of the scene. For example, if the light reading of the darkest object or color is 25 and the light reading of the brightest object or color is 400, the light value on the lightmeter dial midway between these two values (the average brightness) is 100 (fig. 4). Note that the average light intensity is the value *on the lightmeter dial* midway between the darkest-object reading and the brightest-object reading and is *not* the arithmetic average of these two readings.

d. Determining Exposure. Determine the exposure (combination of shutter speed and lens aperture) required as follows:

(1) When reflected light readings are being used, use the REFLECTED LIGHT position of the relative aperture dial (baffle button in normal or released position). When incident light readings are being used, hold the baffle button depressed and use the INCIDENT LIGHT position of the relative aperture dial.

(2) Position the time and brightness dial so that the calibration on the brightness scale (fig. 3) that corresponds with the light reading of the scene or object (*c* above) is aligned exactly with the ASA film rating set on the exposure index dial (*a* above).

(3) Combinations of shutter speed on the time scale and lens aperture (f/ stop) on the relative aperture dial that are aligned will provide the correct exposure for the particular film and light condition. For example, if the EXP. ASA INDEX selector is set at 50 (the ASA rating of the film) and the brightness scale is set at 100 (the reflected light reading) as shown in figure 4, the aligned lens aperture and shutter speed settings are f/4 at 1/1000, f/11 at 1/100, f/16 at 1/50, and f/22 at 1/25. Each of the aligned combinations will provide the same exposure; select the combination (par. 19) that will produce the best negative for the intended purpose.

19. Selecting Best Exposure Setting

a. Selecting Best Combination of Shutter Speed and Lens Aperture. Although each of the aligned combinations of shutter speed and lens aperture (f/ stop) will provide the same exposure (par. 18*d*(3)), the character of the subject determines the particular combination that will produce the best negative. When the scene includes action, a fast shutter speed is required to *stop* the action. When the overall scene is important and there are important details in both the foreground and the background, a small aperture is required to provide depth of field. Select the best combination of shutter speed and f/ stop as follows:

(1) If the movement in the scene is very rapid, for example, an airplane takeoff, use the combination that shows the shortest time on the time scale (f/4 at 1/1000, fig. 4). If the action is less rapid, for example, marching troops, use the combination that shows the next to the shortest time on the time scale (f/11 at 1/100).

(2) If the scene consists entirely of stationary objects, such as an interior in which there are no people, use the combination that shows the smallest aperture on the relative aperture dial (f/22 at 1/25, fig. 4). If the scene includes some slight movement, such as an exterior that includes flags that may be stirred by a breeze, use the combination that shows the next larger lens aperture (f/16 at 1/50).

b. Increasing and Decreasing Exposure. Occasionally none of the aligned combinations (par. 18*d*(3)) will produce exactly the result desired. Scenes that are a

long way from the camera and have little contrast, such as parachutes in the sky, require less exposure. Dark scenes with a great deal of contrast, such as narrow streets between tall buildings, require more exposure. Select the combination (*a* above) most nearly suitable, then use the next smaller lens aperture to decrease the exposure or the next larger lens aperture to increase the exposure. If either case, use the shutter speed aligned with the combination originally selected. For example, if the f/ stop of the selected combination is f/5.6, the next higher f/ stop, f/6.3, will decrease the exposure; the next lower f/ stop, f/4.5, will increase the exposure.

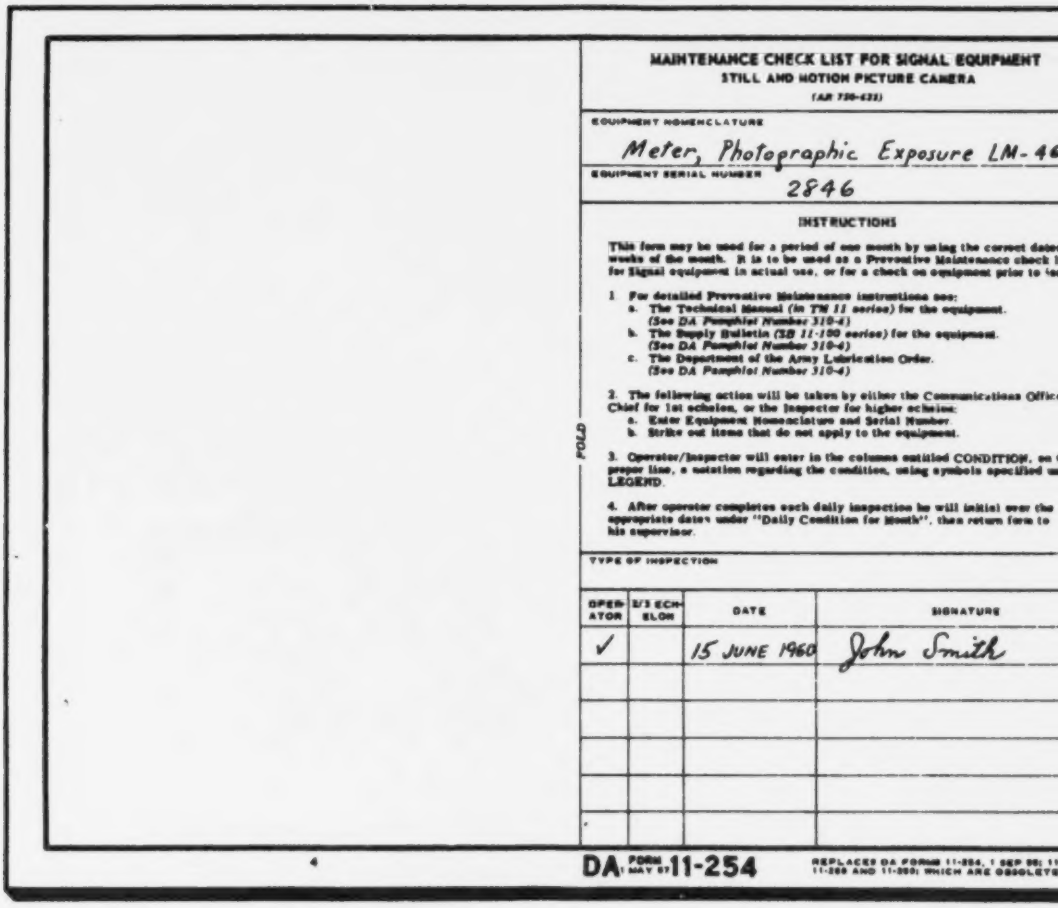
20. Compensating for Filters

Because filters reduce the intensity of the light that reaches the film, when a filter is used, the exposure must be increased in proportion to the filter factor of the filter in use to compensate for this reduction. For example, if the filter factor is 2, the normal (without filter) exposure must be doubled. To determine the proper exposure when a filter is being used, divide the emulsion speed of the film in ASA units (par. 18*a*) by the filter factor. Set the EXP. ASA INDEX selector (par. 18*b*) at the resulting value instead of the full ASA rating of the film, and then take light readings and determine the required exposure in the normal manner (par. 18c and *d*).

21. Use With Motion Picture Cameras

The procedure for using the exposure meter to determine exposure settings for motion picture cameras is essentially the same as for still picture cameras (par. 18) except that for motion picture cameras, the shutter

speed is predetermined and only the correct lens aperture must be found. To determine the correct lens aperture (f/ stop setting) for a particular light condition, follow the procedure described in paragraph 18, except instead of reading the exposure from the aligned combinations of shutter speed and f/ stop setting, read the f/ stop setting that is aligned with the shutter speed of the particular camera in use. If the exact shutter speed is not marked on the time scale, use the f/ stop aligned with the shutter speed nearest to it. A shutter speed of 1/30 second is marked on the time scale by a red dot.



MAINTENANCE CHECK LIST FOR SIGNAL EQUIPMENT
STILL AND MOTION PICTURE CAMERA
(AR 750-623)

EQUIPMENT NOMENCLATURE
Meter, Photographic Exposure LM-4

EQUIPMENT SERIAL NUMBER
2846

INSTRUCTIONS

This form may be used for a period of one month by using the correct date
weeks of the month. It is to be used as a Preventive Maintenance check l
for Signal equipment in actual use, or for a check on equipment prior to

1. For detailed Preventive Maintenance instructions see:
   a. The Technical Manual (in TM 11 series) for the equipment.
   (See DA Pamphlet Number 310-4)
   b. The Supply Bulletin (SB 11-100 series) for the equipment.
   (See DA Pamphlet Number 310-4)
   c. The Department of the Army Lubrication Order.
   (See DA Pamphlet Number 310-4)

2. The following action will be taken by either the Communications Offic
Chief for 1st echelon, or the Inspector for higher echelon:
   a. Enter Equipment Nomenclature and Serial Number
   b. Strike out items that do not apply to the equipment.

3. Operator/Inspector will enter in the columns entitled CONDITION, on
proper line, a notation regarding the condition, using symbols specified u
LEGEND.

4. After operator completes each daily inspection he will initial over the
appropriate date under "Daily Condition for Month", then return form to
his supervisor.

FOLD

TYPE OF INSPECTION

OPERATOR	2/3 ECHELON	DATE	SIGNATURE
✓		15 JUNE 1960	John Smith

4

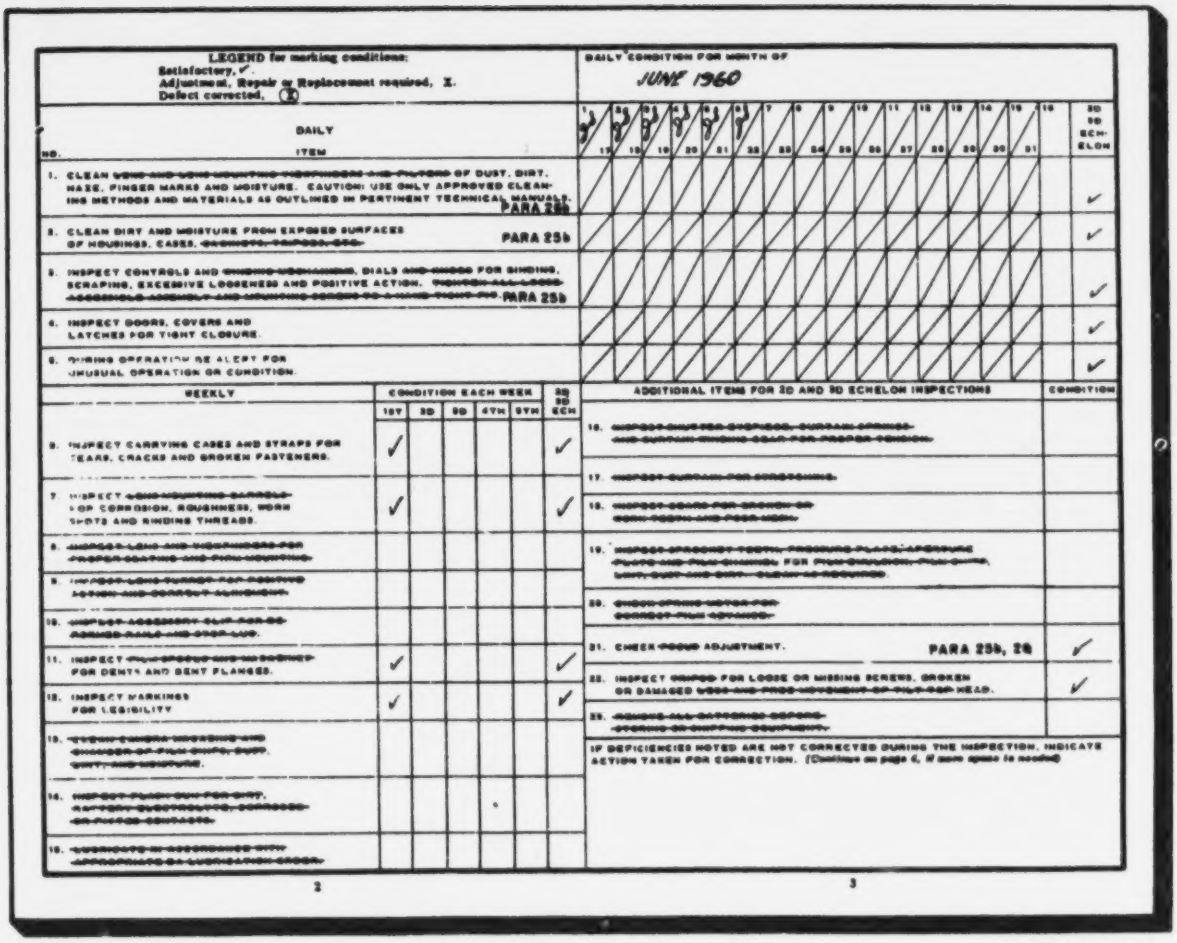
DA FORM 11-254

REPLACES DA FORM 11-254, 1 SEP 50; 1
11-260 AND 11-260; WHICH ARE OBSOLETE

GPO 820-404-4

TM 67

Figure 5. DA Form 11-254, pages 1 and 4.



LEGEND for marking conditions:
Satisfactory, ✓
Adjustment, Repair or Replacement required, X.
Defect corrected, (X)

DAILY CONDITION FOR MONTH OF JUNE 1960

NO.	DAILY ITEM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2D 3D ECHELON
1.	CLEAN [illegible] OF DUST, DIRT, HAZE, FINGER MARKS AND MOISTURE. CAUTION: USE ONLY APPROVED CLEANING METHODS AND MATERIALS AS OUTLINED IN PERTINENT TECHNICAL MANUALS. PARA 25b																																✓
2.	CLEAN DIRT AND MOISTURE FROM EXPOSED SURFACES OF HOUSINGS, CASES, [illegible] PARA 25b																																✓
3.	INSPECT CONTROLS AND [illegible] DIALS AND KNOBS FOR BINDING, SCRAPING, EXCESSIVE LOOSENESS AND POSITIVE ACTION. [illegible] PARA 25b																																✓
4.	INSPECT DOORS, COVERS AND LATCHES FOR TIGHT CLOSURE.																																✓
5.	DURING OPERATION BE ALERT FOR UNUSUAL OPERATION OR CONDITION.																																✓

WEEKLY	CONDITION EACH WEEK 1ST	2D	3D	4TH	5TH	2D 3D ECH
6. INSPECT CARRYING CASES AND STRAPS FOR TEARS, CRACKS AND BROKEN FASTENERS.	✓					✓
7. INSPECT [illegible] FOR CORROSION, ROUGHNESS, WORN SHOTS AND BINDING THREADS.	✓					✓
8. [illegible] FOR PROPER SEATING AND FULL MOUNTING.						
9. [illegible] FOR POSITIVE ACTION AND CONTACT ALIGNMENT.						
10. [illegible] FOR BE ADJUSTED EASILY AND STAY TIGHT.						
11. INSPECT [illegible] FOR DENTS AND DENT FLANGES.	✓					✓
12. INSPECT MARKINGS FOR LEGIBILITY	✓					✓
13. [illegible] CHECK HOUSING AND CHASSIS OF FILM DUST, DUST, DIRT AND MOISTURE.						
14. [illegible] FOR DIRT, RUST, ELECTROLYTE, CORROSION OR FOREIGN MATERIAL.						
15. [illegible]						

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
16. [illegible]	
17. [illegible]	
18. [illegible]	
19. [illegible]	
20. [illegible]	
21. CHECK [illegible] ADJUSTMENT. PARA 25b, 26	✓
22. INSPECT [illegible] FOR LOOSE OR MISSING SCREWS, BROKEN OR DAMAGED [illegible]	✓
23. [illegible]	

IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. (Continue on page 4, if more space is needed)

2 3

Figure 6. DA Form 11-254, pages 2 and 3.

TM9760-206-12-5

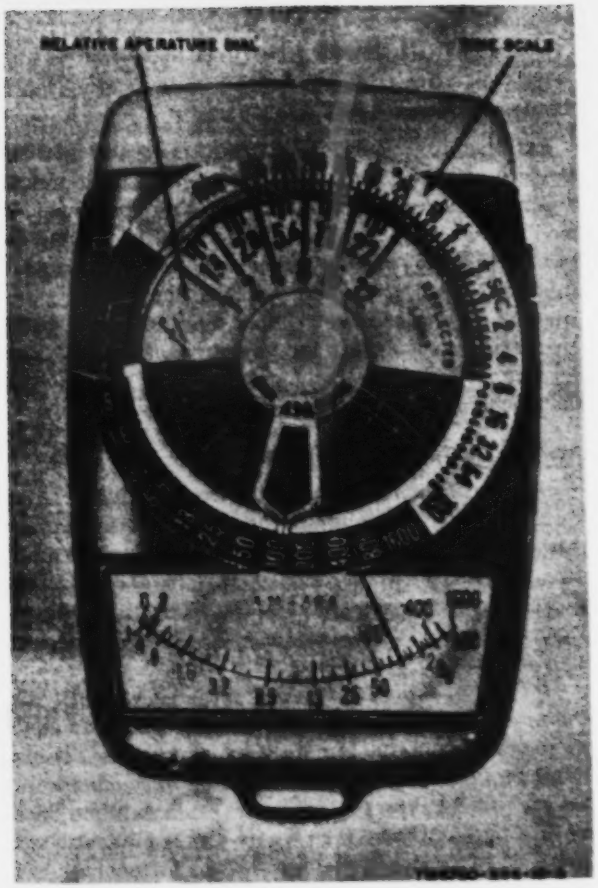


Figure 4. · Typical dial settings and exposure readings.

Section IV.

OPERATION UNDER UNUSUAL CONDITIONS

22. Use in Arctic Areas

Extreme cold (subzero temperatures) and sudden changes in temperature are detrimental to the mechanism of the exposure meter. Protect the exposure meter when it is not actually in use by placing it inside the jacket or in a pocket and store it in a warm (not hot) place after use. In cold, dry weather, the window over the lightmeter dial may receive a static charge that will deflect the pointer and cause a false reading. Breathe on the window to remove the static charge before taking light readings.

23. Use in Tropical and Desert Areas

a. Desert Regions. Protect the exposure meter from dust, extreme heat, and sudden temperature changes. Always enclose the exposure meter in its case when it is not actually in use and store it in a cool place. Never leave the exposure meter exposed to the direct rays of the sun. Temperatures of 125° F. and over may damage the photoelectric cell permanently.

b. Tropical Regions. In the tropical zone, follow the lightmeter readings exactly, because tropical sunlight, although extremely bright, may have less actinic effect on film than the weaker sunlight of temperature zones. Shield the exposure meter from extreme heat at all times and store it in a cool, dry, well-ventilated place when it is not in use. Clean it frequently to prevent corrosion caused by high relative humidity.

CHAPTER 3
MAINTENANCE INSTRUCTIONS

24. Scope of Operator and Organizational Maintenance

First and second echelon maintenance of the LM–46A consist of preventive maintenance (par. 25) and the zero adjustment of the lightmeter pointer (par. 26). No tools or test equipment is required to perform these functions.

25. Preventive Maintenance

a. DA Form 11–254. DA Form 11–254 (figs. 5 and 6) is a preventive maintenance checklist to be used by the operator and by organizational (second echelon) maintenance personnel. Items not applicable to the equipment are lined out in figure 6. References in the ITEM block are to paragraphs in this manual that contain additional maintenance information pertinent to the particular item. Instructions for use of the form appear on the form.

b. Items. The information in this subparagraph supplements DA Form 11–254. The item numbers correspond to the ITEM numbers on the form.

Item	Maintenance procedure
1	Clean the windows of the photoelectric cell, the lightmeter dial, and the relative aperture and exposure index dials with a clean, soft, lint-free cloth. Never use a rough or abrasive cleaning material. See that the windows are not broken, cracked, or excessively scratched.
2	Remove dust, dirt, and moisture from the exposure meter case with a clean, soft, lint-free cloth. In tropical or maritime areas, clean the exposure meter throughly to prevent corrosion caused by condensation or salt-laden air.
3	Rotate the EXP. ASA INDEX selector and the time and brightness dial to see that they do not bind or scrape, and that they remain in the positions at which they are set without slipping. Depress and release the baffle button several times. See that the baffle is lowered fully and that the relative aperture dial shifts to the INCIDENT LIGHT position when the baffle button is depressed and that the baffle and dial return fully to their normal positions when the baffle button is released.
21	Cover the baffle closely with the hand to shut out all light from the photoelectric cell and note whether the lightmeter pointer rests exactly at 0. Adjust the pointer if necessary.

26. Zero Adjustment of Lightmeter Pointer

a. Hold the exposure meter right side up and with the baffle end tilted upward about 45°.

b. Cover the baffle closely with an apaque material or with the hand. Be sure no light can strike the window of the photoelectric cell.

c. Rotate the SET ZERO screw (fig. 3) until the lightmeter pointer indicates exactly 0.

d. Uncover the baffle and aim the exposure meter toward a light source so that the lightmeter pointer

moves upscale. Again cover the baffle closely and note whether the pointer comes to rest at 0.

e. If the pointer does not return exactly to 0 (*d* above), repeat the procedure described in *a* through *d* above until the pointer returns exactly to 0. If this cannot be accomplished by adjusting the SET ZERO screw, higher echelon maintenance is required.

CHAPTER 4
SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

27. Preparation for Shipment or Limited Storage

a. Clean the windows of the exposure meter and wipe all dust and dirt from the case.

b. Enclose the exposure meter in its carrying case. Coil the carrying cord around the carrying case and tie it in place with cotton twine.

28. Repackaging for Shipment or Limited Storage

a. Materials Required. The materials and the approximate quantity of each required to repackage the IM–46A are listed below. For stock numbers of materials, refer to SB 38–100.

Material	Quantity
Single-face corrugated fiberboard	1½ sq ft
Gummed paper tape	4 ft
Waterproof barrier material	3 sq ft
Pressure-sensitive tape	4 ft
Cotton twine	1 ft
Filler material	As required
Desiccant	2 units
Corrugated fiberboard carton	1 (approx 4¾ x 4 x 3½ in.)

b. Packaging. Wrap the exposure meter, enclosed in its case, in waterproof barrier material and seal all closures with pressure-sensitive tape.

(1) Cushion the wrapped exposure meter on all sides with filler material, and then enclose it within a wrap of single-face corrugated fiberboard secured with gummed paper tape.

(2) Wrap the cushioned equipment, together with 2 units of desiccant, in waterproof barrier material and seal all closures with pressure-sensitive tape.

(3) Fold the technical manual horizontally once. Wrap it in waterproof barrier material, and seal all closures with pressure-sensitive tape.

c. Packing.

(1) Place the packaged equipment and technical literature in a corrugated fiberboard carton of suitable dimensions.

(2) Fill all voids in the carton with filler material to prevent any movement of the equipment during shipment.

(3) Seal all seams of the carton with gummed paper tape.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

29. Authority for Demolition

Demolition of this equipment will be accomplished only upon order of the commander. Use the destruction procedures outlined in paragraph 30 to prevent further use of the equipment.

30. Methods of Destruction

Use any or all of the following methods—

a. Smash. Smash the exposure meter; use any heavy tool or object.

b. Cut. Cut the carrying case and the carrying cord; use a pocket knife or any sharp instrument.

c. Burn. Burn the carrying case and cord, the smashed exposure meter, and the technical literature; use gasoline, kerosene, oil, flamethrowers, or incendiary grenades.

d. Dispose. Bury or scatter the destroyed equipment in slit trenches or foxholes, or throw it into streams.

APPENDIX I

REFERENCES

TM 11-401	Elements of Signal Photography
SB 38-100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used by the Army

APPENDIX II
MAINTENANCE ALLOCATION

a. The maintenance allocation chart assigns maintenance functions and repair operations to be performed by the lowest appropriate maintenance echelon. It also specifies the tool and test equipments authorized at each echelon to perform the assigned maintenance functions.

b. The columns are as follows:

(1) *Part or component.* Only the nomenclature or standard item name is shown in this column Parts and assemblies comprising the major end item are listed alphabetically. Mounting hardware, such as screws, nuts, bolts, and washers, is not included.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelon capable of performing the operations. These functions are defined as follows.

(*a*) *Service.* To clean; to preserve; and to replenish fuel and lubricants.

(*b*) *Adjust.* To regulate periodically to prevent malfunction.

(*c*) *Inspect.* To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

(*d*) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment, such as gages, meters, etc.

(*e*) *Replace.* To substitute serviceable assemblies, subassemblies, and parts for unserviceable components.

(*f*) *Rebuild.* To restore an item to a standard as near as possible to its original or new condition in appearance, performance, and life expectancy. This is accomplished by the maintenance technique of disassembling the item completely, inspecting all parts or components, repairing or replacing worn or unserviceable elements, using original manufacturing tolerances and/or specifications, and subsequently reassembling the item.

(3) *1st, 2d, 3d, 4th, 5th echelon.* The symbol X indicates that that echelon is the lowest echelon responsible for performing the associated maintenance operation, but does not indicate, necessarily, that repair parts will be stocked at that level. Echelons higher than the echelon indicated by X are authorized to perform the maintenance operation.

(4) *Tools required.* The numbers in this column represent tool and test equipments required to perform the related maintenance function. These numbers are identified in the Allocation of Tools for Maintenance Functions Chart.

(5) *Remarks.* This column contains any notations necessary to clarify the data cited in the preceding columns.

c. Allocation of tools for maintenance functions columns are as follows:

(1) *Tools required for maintenance functions.* This column lists the tool and test equipments required to perform the assigned maintenance functions.

(2) *1st, 2d, 3d, 4th, 5th echelon.* A dagger (†) indicates that the tool or test equipment is allocated to that echelon.

(3) *Tool code.* The numbers in this column are code numbers that represent the associated tool or test equipment and are used in the maintenance allocation chart, to refer to the indicated item.

(4) *Remarks.* This column is used for explanatory notes.

2. Maintenance by Using Organizations

When this equipment is used by signal service organizations organic to the theater headquarters or communications zone to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

Maintenance Allocation Chart

(1) Part or component	(2) Maintenance function	(3) 1st ech.	(4) 2d ech.	(5) 3d ech.	(6) 4th ech.	(7) 5th ech.	(8) Tools required	(9) Remarks
METER, EXPOSURE, PHOTOGRAPHIC LM-46A.	service	X						Clean
	adjust	X						Zero adjust only
	inspect	X						Visual
	test				X		2	Instrument pointer response
	rebuild					X	1, 3	Plus shop support
ADJUSTER, METER POINTER	replace				X		1	
BUTTON, BAFFLE RELEASE	replace				X		1	
CASE ASSEMBLY	replace				X		1	
GASKET	replace				X		1	
GLASS, CELL	replace				X		1	
MATCHED CELL AND MECHANISM ASSEMBLY	replace				X		1, 3	
PHOTOGRAPHIC EXPOSURE METER SUB-ASSEMBLY	replace				X		1	
SLIDER ASSEMBLY	replace				X		1	
WINDOW DIAL	replace				X		1	

Allocation of Tools for Maintenance Functions

(1) Tools required for maintenance functions	(2) 1st ech.	(3) 2d ech.	(4) 3d ech.	(5) 4th ech.	(6) 5th ech.	(7) Tool code	(8) Remarks
LM-46A							
TOOL EQUIPMENT TK-21/G				(†)	(†)	1	
METER, FOOT CANDLE, PHOTOELECTRIC ME-86/U.				(†)	(†)	2	
SCREWDRIVER, STRADDLE FOR DEJUR PART NO. Z-7.182B				(†)	(†)	3	For slotted cylindrical nut 3/16 in. od x 4/40 in. id 031 035 x 030 slot. To be issued 1 per 1-5 MOS 295.1.

APPENDIX III
BASIC ISSUE ITEMS

Section I. INTRODUCTION

1. General

a. Scope. This appendix lists items supplied for the initial operation of the equipment. The list includes all items issued as *part of* the major end item. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

b. Columns. The columns of section II are:

(1) *Source, maintenance, and recoverability code.* Not used.

(2) *Federal stock number.* This column lists the 11-digit Federal stock number.

(3) *Designation by model.* (Not used).

(4) *Description.* Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description on the requisition.

(5) *Unit of issue.* The unit of issue is the supply term applied to the smallest quantity by which the individual item is counted for procurement, storage, requisitioning, and issue purposes.

(6) *Expendability.* Expendable items are indicated by the letter X; nonexpendable items are indicated by NX.

(7) *Quantity authorized.* For "Items Comprising an Operable Equipment", the column lists the quantity of each item supplied for the initial operation of the equipment.

(8) *Illustrations.* The number in the "Figure No." column designates the figure number of the illustration in this technical manual in which that particular item is shown. The numbers in the "Item No." column correspond to item numbers appearing on the associated illustration that identify particular items.

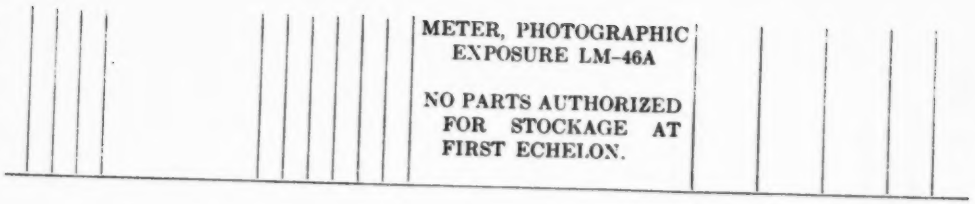
2. Second Echelon Maintenance Parts

No maintenance parts are authorized for stockage at second echelon.

Section II. FUNCTIONAL PARTS LIST

(1) Source: maintenance and recoverability code	(2) Federal stock No.	(3) Designation by model	(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized	Illustrations (8) Figure No.	Illustrations (9) Item No.
			ITEMS COMPRISING AN OPERABLE EQUIPMENT METER, PHOTOGRAPHIC EXPOSURE LM–46A					
	6760–810–8385		METER, PHOTOGRAPHIC EXPOSURE LM–46A: 0.1 to 6000 candles per sq ft; 45 deg hor plane 30 deg ver plane; metal; ft candle mea 0 to 1600, grd in incr of 100-% dim, 3 1/16 in. lg x 2 1/2 in. wd x 1 1/16 in. thk; wth carrying case of cord; spc fea de-	ea	NX		1	3

(1) Source maintenance and recoverability code	(2) Federal stock No.	(3) Designation by model	(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized	Illustrations (8) Figure No.	Illustrations (9) Item No.
			signed for incident light reading and reflected light reading, film speed range .1 to 12,000 A.S.A. time range 1/1000 sec to 100 sec apature range, f/1 to f/32; DeJur-Amsco part No. Z22.-165.					
	Ord thru AGC		TECHNICAL MANUAL TM-11-6760-206-12.	ea	X	2		
	6760-752-7912		CASE, METER: DeJur-Amsco part No. Z-10.1313.	ea	X	1	1	2
	6760-776-0630		CORD, CARRYING: DeJur-Amsco part No. Z-10.1314.	ea	X	1	1	1
			RUNNING SPARES AND ACCESSORY ITEMS					


METER, PHOTOGRAPHIC
EXPOSURE LM-46A
NO PARTS AUTHORIZED
FOR STOCKAGE AT
FIRST ECHELON.

By Order of *Wilber M. Brucker*, Secretary of the Army:

L. L. LEMNITZER,
General, United States Army,
Chief of Staff.

Official:

R. V. LEE,
Major General, United States Army,
The Adjutant General.

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For explanation of abbreviations used, see AR 320-50.

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